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This study was conducted in an attempt to provide basketball instructors or coaches with a single skill test with which to objectively measure basketball playing ability. The judges' ratings served as the criterion for test validation.

The Glassow, Colvin, and Schwarz bounce and shoot skill test was selected for further investigation because it combined the essential skills of basketball with gamelike situations which could be objectively measured and it was easy to administer. According to a factor analysis study of basketball skill tests by Leilich (22), the Glassow, Colvin, and Schwarz bounce and shoot test had a correlation coefficient of $r = .63$ with the basketball motor ability factor.

The original version of the Glassow, Colvin, and Schwarz bounce and shoot skill test was administered to 15 members of the women's intercollegiate basketball team of the University of North Carolina at Greensboro and 10 members of the women's intercollegiate basketball team of High Point College. A revised form of the test which omitted the subjectively imposed penalities of running with the ball, double bounce, and failure to start from behind the twenty-four inch line was administered to both teams. All players were rated subjectively on playing ability by three judges during the regular season games.

The highest validity coefficients obtained were $r = .73$ for time in the original test and $r = .65$ for time in the revised test. Accuracy alone or twice accuracy combined with time was not valid for either the original or the revised form of the test. The correlation coefficients between the original and revised forms of the test indicated that time alone ($r = .86$) or twice time plus accuracy

($r = .89$) of all the scoring methods produced results with the highest degree of agreement.

On the basis of the data obtained in this study the following conclusions were drawn:

1. Shooting accuracy alone, as measured by the bounce and shoot test, was ineffective in rating college students' basketball playing ability.

2. A combination of twice time plus accuracy or time alone were the most valid and reliable methods for scoring the bounce and shoot test for either the original or revised form of the test.

3. The revised version of the bounce and shoot test was a statistically reliable and valid as well as administratively practical measure of basketball playing ability.

4. The revised version of the bounce and shoot test with time and accuracy scores converted to T-scores and combined on the basis of twice time plus accuracy can be used for determining basketball playing ability of college women.

A BASKETBALL SKILL TEST FOR COLLEGE WOMEN

by

Ann Thomas Lambert

A Thesis Submitted to
the Faculty of the Graduate School at
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Approved by

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APPROVAL SHEET

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CHAPTER I

INTRODUCTION

One of the problems continuously facing the teacher of physical education is the evaluation of progress and ability ranking in skills. With the increasing enrollments at the college level many institutions either are using or are contemplating the use of proficiency tests as a means of determining which students should be excused from the physical education requirement. In still other institutions staffs are seeking ways of classifying or screening students so that they can be more adequately advised as to the level of instruction that should be sought. It is generally agreed that students tend to progress more rapidly when they are grouped according to ability in an activity. From the teacher's standpoint sectioning students according to ability affords better opportunities for more individualized instruction within classes. When adequate devices are available to measure performance of skill for any activity, the results can be used in classification of students or players according to levels of ability, in determining progress in skill, in providing an incentive to practice, and in providing proficiency or achievement levels according to skill test scores.

Numerous skill tests have been constructed. There is, however, a need for improvements in those tests that are available as well as the addition of tests in most activity areas. The value of the skill tests that are available is not substantiated by statistical evidence. In basketball there is a need for a single

skill test to objectively measure basketball playing ability. Such a test should meet the requirements of statistical reliability and validity, of measuring the essential skills of basketball, and at the same time, of being administratively practical and economical.

The writer was made aware of this need since basketball is an activity in which she has, as a teacher and coach, been called upon to classify students according to skill. It was difficult to find a means by which students could be tested individually, quickly, and accurately in gamelike situations. Although skill tests in basketball have been devised to group and rate players, most of those available consist of batteries of tests made up of from three to five items which are time consuming to administer.

It is generally agreed that the important elements to consider when analyzing the essential skills of basketball are ball handling ability, handling the body in relation to the ball, and ball and body skill combinations. Of all the tests with which the writer was familiar the Glassow, Colvin, and Schwarz bounce and shoot skill test (one item of a three item battery) appeared to contain more of the essential skills in basketball than any other single item. It also had an advantage of being easy to administer and possessed gamelike qualities. Penalties imposed for subjectively judged violations committed during the test appeared to detract from its objectivity as well as to penalize a performer for executing skills that are legal in today's game of basketball. It was to meet a need in her own teaching situation and to test her hypothesis that a bounce and shoot test was an effective tool for measuring basketball playing ability that the writer

undertook this study.

Statement of the Problem

The purpose of this study was to devise a skill test which would provide college women basketball instructors and/or coaches with a valid objective measurement of basketball skill of experienced students or players.

The Glassow, Colvin, and Schwarz bounce and shoot skill test plus a revision of that test which eliminated the limited dribble, the "catch and pass" back, and the subjectively imposed penalties for running with the ball, double bounce, and line violation were the instruments selected for investigation.

Members of the women's intercollegiate basketball teams of the University of North Carolina at Greensboro and of High Point College were used as subjects for the study.

CHAPTER II

REVIEW OF LITERATURE

The literature reviewed for this study was divided into two sections. The first of these is concerned with the elements or skills considered basic to successful basketball performance. The second consists of a review of basketball skill tests.

Testing Basic Skills of Basketball

Most basketball skill test constructors (9, 11, 12, 15, 22) have agreed that there are three important areas to consider when analyzing the sport into essential skill elements. These areas are: ball handling ability which includes throwing accuracy, throwing speed, throwing timing, and basket shooting skills; handling the body in relation to the ball which includes changing direction, ability to move quickly, and jumping skills; and combinations of ball and body skills. This latter area refers to combinations of bouncing and shooting, shooting and catching, pivoting and passing, running and catching, and other skill combinations involving ball control and handling the body.

According to Fox and Usilaner (11:42) ball handling is the most fundamental requisite in basketball. They stated that regardless of shooting skill and speed, a player who could not handle the ball would not fit into offensive styles of play easily. Dyer, Schurig, and Apgar (9:130) have analyzed fundamental

skills in basketball and concluded that ball handling involved the greatest variety of abilities. These authors enumerated twenty-four possible combinations in passing and the same number in catching. They further broke down ball handling into accuracy and speed of passing while motionless and while in motion, to a stationary player, or to a moving player.

Using Thurston's method for determining multiple factors, Wendler (20) reported a study on critical analysis of test elements used in physical education. He found four common factors in test performance: (1) strength, (2) velocity or speed of movement, (3) motor educability, and (4) sensorimotor coordination. The basketball skill tests of dribbling, target throw, shooting baskets, and the Johnson test were ranked high on the list of correlations with the factor of motor educability.

Scott (18) stated that it is impossible to test all skills involved in a game situation. Others, including Dyer, Schurig, and Apgar (9), have agreed there was no one test which had been standardized and validated for use throughout the total basketball playing age range. Motor abilities such as handling the ball and the body accurately, speedily, and effectively in relation to other players can be measured objectively through the use of skill testing. According to Scott, a battery of skill tests that measures several of the principal skills or a single test which involves more than one skill will give the most accurate picture of performance. (18:364) Most authors agreed that in measuring motor skill, test constructors have omitted the intangible, unmeasurable elements such as strategic ability, cooperative team play, or as Nelson (16) described it, "athletic

potential." A review of the literature in basketball motor ability tests for girls and women indicated that there is not a battery or single test that purports to measure the intangible qualities of athletic smartness or athletic potential.

Skill Tests in Basketball

Measurement of skill requires scientifically constructed tests which are valid, reliable, objective, and practical. (15) Broer (8) stressed that when a single test or battery "claims to measure" a complicated skill such as playing ability, the validity needs to be proven and evidence shown that the test or tests given evaluates the student as does some other acceptable criterion of the skill in question. She also stated that there is no question of the validity of a test which evaluates a single skill element by the performance of that particular skill. According to Stroup (6), the difficulty of devising a test that demonstrates high validity increases as the purpose for which the test is chosen broadens. Thus, it would appear that skill testing should be limited to measurement of those abilities that are of primary importance in the game considered and the testing should be scientific and objective.

Among the criteria used to establish practical validity of sports are subjective judgment ratings. According to Scott (4), one criticism of judges' ratings is the element of subjectivity involved, but this element may be lessened if the judges use a checklist of factors to be judged and a scale for standardizing the ratings. Research has indicated that if judges are used to subjectively rate players, they must be capable and competent in the skill which is to be measured. Glassow and Broer (3) emphasized the necessity of using at least three judges

when subjectively rating players.

Many skill tests have been devised in basketball to group and rate both men and women players. Edgren (10) was among the first to present a basketball test for college level men based upon statistical evidence. His tests included a speed pass, accuracy pass, pivot and shoot, speed dribble, dribble shoot, accuracy shooting, opposition shooting, and ball handling. A validity coefficient for the Edgren ball handling test of .77 was obtained between the test and subjective ratings of the performance of players. No reliability coefficients for the tests were included in the study.

In 1934, after reviewing thirty-six tests, Young and Moser (21) reported a short battery of tests to measure basketball playing ability of college women. The authors analyzed the game into skill elements and reviewed all of the existing literature of tests purporting to measure basketball playing ability. Each test reviewed was subjected to the criteria of validity, reliability, and objectivity. Five tests were selected for the final battery: the Edgren ball handling test, the wall speed pass, the free jump and reach, the bounce and shoot, and the moving target test. A validity coefficient of .86 was established by correlating the combined scores of the five tests with ratings by judges of player's performance in game situations. Intercorrelations between items were low indicating that different qualities of basketball were being measured.

Schwarz (17) devised a battery of basketball tests for high school girls which included the following items: bounce over a six foot area, jump and reach, pass and catch against a wall, accuracy throw for goal, and pivot, bounce and

throw for goal. Statistical evidence for validity and reliability was not included in the study; however, validity was established through critical analysis of experts. It was suggested that the tests included in the Schwarz battery could be used on the college level with slight modifications.

In 1937, Cozens, Cubberly, and Neilson (2) presented a basketball achievement battery which included the jump and reach, one minute goal shooting, push pass for speed and accuracy, pivot and pass, and the pivot and bounce for distance. No attempt was made to validate the tests; however, the authors did state that the skills measured were those used in playing basketball.

Clarke (1) described the Johnson basketball test as a two battery test for high school boys. One battery measured basketball ability by a field goal speed test, basketball throw for accuracy, and a dribble. The second battery measured "potential" basketball ability by footwork, jump and reach, dodging run, and the Iowa Revision of the Brace test. The reliability coefficient for the ability test was .89 and for the potential ability .93. The validity coefficients were .88 and .84 respectively.

Glassow, Colvin, and Schwarz (12) shortened the Young and Moser test to a three item battery including the bounce and shoot, speed pass, and the zone toss to be used as an objective measure of playing ability in basketball for college women. (12) Recognizing the need to combine the accuracy score and the speed score in the bounce and shoot, the authors devised a scoring plan which scaled the scores for speed and accuracy in distance from the mean as measured by the standard deviation of each distribution.

The mean, plus the minus one-quarter of a sigma, was scored 9, and each one-half sigma above was scored an additional point. Distances below the mean were scored one point less for each one-half sigma.

Minus 1/2 sigma	Minus 1/2 sigma	Minus 1/4 sigma	Mean	Plus 1/4 sigma	Plus 1/2 sigma	Plus 1/2 sigma
7	8			9	10	11

(12:62)

The accuracy and speed were scored in "like" units and the two scores were combined by multiplying the two unit values. The product was the final score for the bounce and shoot test. Fouls of double bounce, running with the ball, and failure to start from behind a twenty-four inch restraining line were subjectively imposed by adding a second to the speed score for each occurrence before the speed score was rescaled in terms of the standard deviation. The Glassow, Colvin, and Schwarz battery yielded a validity coefficient of .66 against a subjective rating criterion. The reliabilities of the separate test items ranged from r = .74 to .87.

In 1939 Dyer, Schurig, and Apgar (9) presented evidence that a battery of tests including the Edgren ball handling test, a bounce and shoot test, and a free jump and reach test measured different aspects of ability in basketball and were valid, reliable, and objective measures of basketball motor ability for high school girls and college women.

Knox (13) developed a basketball skill test battery for high school or college varsity players composed of a speed dribble, wall bounce, dribble-shoot, and the "penny-cup" test. Reliability coefficients for the individual items ranged from .58 to .90. The total battery had a reliability or r = .88. The criterion for

validating the tests was the scoring of varsity players in actual games. At least four out of five varsity players finished among the top five on each test score.

Scott and French (8) recommended two tests to measure basketball ability: Johnson's half-minute shooting test, and a passing test which was a modification of the Edgren ball handling test. The validity coefficient for the half-minute shooting test was .60 when compared with a sports test criterion using 155 college freshman women as subjects. A reliability of $r = .70$ was obtained on the basis of repeated trials. The validity coefficient for the passing test was .51 when judges' ratings of ball handling ability were used as the criterion. If only one test was administratively possible, the authors recommended the use of the half-minute shooting test.

Leilich (22) undertook a factor analysis of basketball motor ability test items. She analyzed 14 selected basketball test items measuring various aspects of motor performance. The data, collected in 1951-1952, were obtained from a sample of 110 college women. Leilich defined basketball motor ability as: "Those measures used to evaluate the efficiency in the manipulation of the body in performing basketball skills." Leilich's factor analysis study of the primary components found basketball motor ability, speed, ball handling involving passing accuracy and speed, and ball handling involving accuracy in goal shooting to be basic in basketball skill testing. She proposed a three item battery consisting of the Glassow, Colvin, and Schwartz bounce and shoot test, half-minute shooting (described by Scott and French (8) and often referred to as the Johnson test), and the push pass for accuracy as being valid and reliable. The Glassow, Colvin,

and Schwarz bounce and shoot test yielded an r = .63 with the basketball motor ability factor, but failed to correlate significantly with the speed factor. Leilich found this hard to explain. She hypothesized that the subjects tended to sacrifice a certain amount of speed for accuracy when performing the test. Leilich summarized that the Glassow, Colvin, and Schwarz bounce and shoot primarily measured aspects of basketball motor ability (r = .63) and the specific ball handling skills common to basketball ability (r = .31).

In 1953, Miller (14) established norms based on percentile rankings and T-scores for the bounce and shoot test, the half minute shooting test, and the push pass for accuracy. These three tests were chosen by Miller on the basis of Leilich's factor analysis study. Achievement scales were determined by classifying the raw scores of the bounce and shoot test into an accuracy classification and a time in seconds classification. Miller did not describe a method for combining accuracy and time into a single score. Subjects for Miller's study were college women majoring in physical education.

In looking for an administratively economical test, Stroup (19) used game results as the criterion for validating his basketball skill tests for college men. His three item battery included goal shooting, wall passing, and dribbling. Scoring was based upon the number of passes completed, goals made, and obstacles passed while dribbling. Time for each test was one minute. Stroup concluded that an average of the skill scores on the three individual items comprised a battery which was a valid measure of team strength in basketball.

Scott and French were critical of the combination of skills in the bounce

and shoot test. Although this test has "gamelike" qualities, they claimed that "the lack of pressure for speedy action characteristic of the game partly nullifies the possible value." (8:12) Nothing prevents the player from pausing before attempting the shot which would defeat the purpose of having the player do a pivot or bounce before shooting. They also criticized the violations which are considered in the scoring as this would necessitate an extra helper or judge to subjectively judge violation occurrences.

The review of literature showed that many basketball skill test batteries have been devised, but single tests have not been used as measures of basketball playing ability. The game of women's basketball has changed in many aspects in recent years. The review of literature indicated that most of the tests available were devised when the rules of the game differed considerably from those in use today. On the basis of this evidence there would still appear to be a need for a single test which is administratively practical and economical in evaluating basketball playing ability.

CHAPTER III

PROCEDURE

This study was undertaken in an attempt to provide basketball instructors or coaches with a skill test to objectively measure the basketball playing ability of experienced college women students and players.

Selection of Subjects

The subjects selected for the study were members of the women's intercollegiate basketball teams of the University of North Carolina at Greensboro and High Point College. Members of the teams were selected from a large number of interested participants on a try-out basis.

Subjective Rating Scale

Since subjective ratings of performance in game situations were to serve as the criterion of test validation, a rating scale was devised. A rating sheet was designed to be simple to use but at the same time to cover all of the essential skills necessary in playing the game. The general skills to be evaluated were ball handling ability, handling the body in relation to the ball, and ball and body skill combinations. A detailed description of the individual skills included in the general categories to be rated was purposely avoided. Examples of the individual skills included in each of the general categories were as follows: (1) ball handling ability; speed, accuracy in passing and catching, shooting, timing,

and control; (2) handling the body in relation to the ball; jumping, pivoting, reaching, rebounding, and changing direction; and (3) ball and body skill combinations; dribbling, accuracy in shooting, and over-all skill judgment. A copy of the rating categories and the recording sheet are included in Appendix A.

Selection of Judges

Three judges were selected to rate the performance of the players of both teams in game situations. The judges met the requirement of competency in rating basketball players. Each judge had had experience in playing as a member of a varsity team. In addition each had several years experience as a coach of a varsity team. Two of the judges had worked primarily with college aged women. The third was a high school girls' basketball coach. Three scheduled game dates were selected as rating sessions. Preliminary sessions were held with the judges to explain and try out the procedure to be used in subjectively rating the players.

Selection of Tests

The Glassow, Colvin, and Schwarz bounce and shoot test was selected by the investigator as a possible single item for measuring basketball playing ability in either its original or a revised form. This test was selected because it combines the essential skills of basketball into gamelike situations which can be objectively measured and it is easy to administer. When analyzing the skills involved in the test, it would appear that of the essential skill elements of basketball the following would contribute to successful performance: throwing

speed, shooting accuracy, ability to change direction and move quickly, bouncing and shooting and running and catching. Leilich (22) found that the bounce and shoot yielded an $r = .63$ with the basketball motor ability factor and measured specific ball handling skills. See Appendix B for complete test directions.

A possible revision of the Glassow, Colvin, and Schwarz bounce and shoot test was considered which would eliminate subjectively imposed penalties of running with the ball, double bounce, and failure to start from behind the twenty-four inch line. In the original version of the test a second was added to the time score for each violation. If a student or player elected to take more than one bounce (at the time the test was first constructed only a single bounce was legal), she was already penalizing herself because double bouncing would increase her time score. If a highly skilled or experienced student inadvertently ran with the ball as she was starting her bounce, she may have had a total subjectively imposed penalty of ten seconds added to her time score which could have categorized her into an elementary group. The instructor or coach could conceivably correct running with the ball with a few verbal cues or a simple demonstration. Scott (8) had criticized the violations which were considered in the scoring because it necessitated having an extra judge to subjectively judge violation occurrences. By the elimination of the subjectively imposed penalties the investigator hypothesized that the results of the test would be more accurate and the test would be more practical to administer.

Methods of Scoring

Scoring for the Glassow, Colvin, and Schwarz version of the bounce and shoot skill test was based upon a time in seconds score and an accuracy score. In scoring the test, the authors combined time and accuracy equally. For the purposes of this study various equated combinations of time and accuracy were used in the scoring of both the original and revised versions of the tests. The combinations used were as follows: time alone, accuracy alone, twice time plus accuracy, twice accuracy plus time, and a single time and accuracy combination. Prior to combining accuracy and time scores each was converted to a T-score. The investigator desired to find the most reliable and valid method for scoring the two forms of the bounce and shoot test.

Administration of Tests

The University of North Carolina at Greensboro women's intercollegiate basketball team was rated subjectively on February 13 during a game with the University of North Carolina at Chapel Hill and on February 17 during the Appalachian State University game. The High Point College team was rated subjectively on February 25 during a game with the University of North Carolina at Greensboro.

The original Glassow, Colvin, and Schwarz bounce and shoot test was administered to the women's intercollegiate basketball team of the University of North Carolina at Greensboro on March 6, 1969. The revised test was administered on March 11, 1969. The tests were administered to the High Point College team in the same order on December 9, 1968 and May 14, 1969. The

time lapse between administrations in the latter situation was due to scheduling difficulties at High Point College.

The original and revised tests were administered by two people. The scorer recorded the accuracy of each subject and kept a record of violations and time. The timer timed each subject to the nearest tenth of a second and in addition, reported violations to the scorer. The investigator served as the timer for all test administrations. A graduate student in physical education at the University of North Carolina at Greensboro, an experienced basketball player and coach, served as the scorer.

Treatment of Data

Subjective judgment ratings of performance were used as the criterion for establishing test validation. Interrelationships were calculated, using the Pearson product-moment technique based upon raw scores, for judges' ratings between the games. The judges scored the players on a 3 point scale, (from 3, high, to 1, low) and a plus or minus was permitted with any of the numbers.

Pearson's product-moment correlation, based upon original data, was the method used to compute the coefficients of correlation for all reliabilities, validities and relationships between original and revised forms of the tests. T-scores were calculated in order to combine scores for accuracy and time. Reliabilities were calculated on the basis of test-retest scores.

CHAPTER IV

ANALYSIS OF DATA

This study was undertaken in an attempt to provide basketball instructors or coaches with a skill test to objectively measure the basketball playing ability of college women who were experienced players.

The original Glassow, Colvin, and Schwarz bounce and shoot basketball skill test was administered to 10 members of the women's intercollegiate basketball team of High Point College and 15 members of the University of North Carolina at Greensboro women's intercollegiate basketball team. A revised form of the test which omitted the subjectively imposed penalties for violations of running with the ball, double bounce, and failure to start from behind the twenty-four inch line was also administered to the same subjects.

Pearson's product-moment coefficient, based upon original data, was the method used to compute all of the coefficients of correlation. T-scores were calculated to standardize and combine the test scores of accuracy and time.

Three judges rated the performance of players from the University of North Carolina at Greensboro during two games. Members of the High Point College team were rated subjectively during one game. The judges used a 3 point scale (3, high to 1, low) for the evaluation. The use of a plus or minus with any of the numbers was permitted. The sum of the judges' ratings for each student was totaled for each game to serve as the criterion for test validation. The re-

liability of judges' ratings was based upon correlations calculated from data obtained during the two games played by the team from the University of North Carolina at Greensboro.

The data, presented in Table I, indicated a coefficient of correlation of .89 for Judge 2 to be the highest obtained reliability. Other reliabilities were $r = .84$ for Judge 3 and $r = .78$ for Judge 1. These reliability coefficients indicated a satisfactory degree of consistency for each of the three judges.

Comparisons were made among the ratings of the three judges. As is evidenced in Table II, page 21, the interrelationships of the judges' ratings for each of the three games were fairly high. Judges 2 and 3 consistently had the highest relationships for all the games with resulting correlation coefficients of .89, .95, and 88 respectively. When the ratings for subjects in all games were combined, the correlation coefficient for Judges 2 and 3 resulted in an r of .91. The correlation coefficients for Judges 1 and 3 and Judges 1 and 2 were slightly lower ($r = .87$, $r = .75$) for the three games. The ratings done on the first game ($n = 21$) showed the highest interrelationships among all the judges. The fact that fewer subjects were rated during games two and three probably was responsible for the lower coefficients.

Scoring for the Glassow, Colvin, and Schwarz version of the bounce and shoot test was based upon both an accuracy score and a time in seconds score. Leilich (22) hypothesized that the accuracy score failed to correlate significantly with the time score because the subjects tended to sacrifice a certain amount of speed for accuracy when performing the test. Assuming this

TABLE I

RELIABILITY COEFFICIENTS OF JUDGES' RATINGS

N = 37

Judges	r
1	.78
2	.89
3	.84

TABLE II

INTERRELATIONSHIP OF JUDGES' RATINGS

N = 37

Judges	r^1 N = 21	r^2 N = 8	r^3 N = 8	Total r N = 37
1-2	.81	.69	.69	.75
1-3	.87	.77	.79	.87
2-3	.89	.95	.88	.91

hypothesis to be true, the investigator determined several combinations for scoring time and accuracy in an effort to find the most reliable and valid method of scoring. The scoring methods devised included consideration of both the time value and the accuracy score independently. In addition different weighted combinations of the two factors were considered. In the latter instances time and accuracy scores were converted to T-scores prior to the combining.

The data in Table III indicate the coefficients of reliability for the various scoring combinations for the original and revised versions of the test. The original version, using the accuracy score only, had the lowest reliability ($r = .43$). The accuracy score for the revised test yielded a reliability coefficient of .49. The range of reliabilities for all combinations was from $r = .43$ for accuracy in the original test to $r = .93$ for a weighted score of twice the time factor T-score plus the accuracy T-score in the original test. The revised test scoring method of twice time T-score plus accuracy T-score reliability coefficient was .92 while that of the revised test time alone was .92. This would appear to indicate that the accuracy factor did not contribute to the reliability of the revised test. The reliability coefficient of the time score alone for the original test was .82.

According to the data obtained from the subjects in this study, the accuracy score alone was not a reliable measure for evaluation. When the accuracy score (in the form of a T-score) was combined with a time T-score the reliability coefficients were higher, but only for the revised test or when time was weighted twice, could these coefficients be considered acceptable.

TABLE III

RELIABILITY COEFFICIENTS OF TESTS

Scoring Method	Original Test r	Revised Test r
Time only	.82	.92
Accuracy only	.43	.49
Time accuracy	.62	.70
Time 2 accuracy	.52	.71
2 Time accuracy	.93	.92

The validity coefficients for all scoring methods of the tests, as illustrated in Table IV, ranged from .14 for the accuracy score in the original version of the test to .73 for the time score in the same form of the test. The highest validities obtained were r = .73 for the time score in the original test and r = .65 for the time score in the revised test. Twice time T-score plus accuracy T-score in the original test yielded an r of .62 and the twice time plus accuracy scoring method for the revised test the correlation coefficient was .60. The accuracy alone or twice accuracy plus time methods were not valid measures for either the original or revised forms of the test.

When correlation coefficients were calculated between the various scoring methods for the original and revised forms of the tests (see Table V, page 26) it was found that time alone (r = .86) or twice the time plus accuracy (r = .89) had the highest relationships. Again the accuracy scoring methods yielded the lowest correlation coefficients.

From the analysis of these data it was found that the accuracy score for the bounce and shoot test when considered alone as a scoring method is a poor indicator of basketball playing ability. It was neither a reliable or valid measure for the original or revised version of the test. The weighted combination of one accuracy with two times the time score was both a reliable and valid measure of basketball playing ability. Using the time score only for the revised test resulted in a reliability coefficient of r = .92 and a correlation coefficient of validity of r = .65. These results imply that the use of the time score alone and the revised form of the test would give a reliable and valid measure of basketball

TABLE IV

VALIDITY COEFFICIENTS OF TESTS

Scoring Method	Original Test r	Revised Test r
Time only	.73	.65
Accuracy only	.14	.24
Time accuracy	.44	.50
Time 2 accuracy	.20	.47
2 Time accuracy	.62	.60

TABLE V

CORRELATION COEFFICIENTS BETWEEN ORIGINAL AND REVISED FORMS OF TESTS

Scoring Method	r
Accuracy	.56
Time	.86
Time accuracy	.79
Time 2 accuracy	.74
2 Time accuracy	.89

playing ability. The investigator believes, however, if the time score is used alone, students or players will realize the advantages of rushing through the test and will ignore the accuracy score in order to better their time. Therefore, the combination of scoring of two times the time plus one accuracy would appear to be a better choice as an indicator of basketball playing ability.

The revision of the Glassow, Colvin, and Schwarz test omitted the subjectively imposed penalties of running with the ball, double bounce, and failure to start from behind the twenty-four inch line. These omissions did not appear to affect the reliability of the test or to result in appreciably lower validity coefficients. One instructor or coach could easily administer the revised test to a group of students or players since she would not have to be concerned with watching for violations during the test administration.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study was conducted in an attempt to provide basketball instructors or coaches with a single skill test with which to objectively measure basketball playing ability of experienced college women. Three competent judges were selected to rate the basketball players during game situations. A rating sheet was designed to be simple to use but, at the same time, to cover all of the essential skills in playing the game.

The Glassow, Colvin, and Schwarz bounce and shoot skill test was selected for further investigation because it combined the essential skills of basketball with gamelike situations which could be objectively measured and it was easy to administer. According to a factor analysis study of basketball skill tests by Leilich (22), the Glassow, Colvin, and Schwarz bounce and shoot test had a correlation coefficient of $r = .63$ with the basketball motor ability factor.

The original version of the Glassow, Colvin, and Schwarz bounce and shoot skill test was administered to 15 members of the women's intercollegiate basketball team of the University of North Carolina at Greensboro and 10 members of the women's intercollegiate basketball team of High Point College. A revised form of the test which omitted the subjectively imposed penalties of running with the ball, double bounce, and failure to start from behind the

twenty-four inch line was administered to both teams. All players were rated subjectively on playing ability by three judges during regular season games.

The judges' ratings were reliable measures of basketball playing ability. The interrelationships of judges' ratings for each of the three games were computed. The degree of agreement among the judges was satisfactory for all rating sessions. The range of reliabilities for all scoring combinations was from .43 for accuracy in the original test to .93 for twice time plus accuracy in the original test. The statistical evidence implied that accuracy alone was not a reliable measure of basketball playing ability. Twice accuracy plus time had practically the same reliability ($r = .71$) as single accuracy with a time combination ($r = .70$).

The highest validity coefficients obtained were $r = .73$ for time in the original test and $r = .65$ for time in the revised test. Accuracy alone or twice accuracy combined with time was not valid for either the original or the revised form of the test. The correlation coefficients between the original and revised forms of the test indicated that time alone ($r = .86$) or twice time plus accuracy ($r = .89$) of all the scoring methods produced results with the highest degree of agreement.

On the basis of the data obtained in this study the following conclusions were drawn:

1. Shooting accuracy alone, as measured by the bounce and shoot test, was ineffective in rating college students' basketball playing ability.

2. A combination of twice time plus accuracy or time alone were the

most valid and reliable methods for scoring the bounce and shoot test for either the original or revised form of the test.

3. The revised version of the bounce and shoot test was a statistically reliable and valid as well as administratively practical, measure of basketball playing ability.

4. The revised version of the bounce and shoot test with time and accuracy scores converted to T-scores and combined on the basis of twice time plus accuracy can be used for determining basketball playing ability of college women.

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APPENDIX A

SUBJECTIVE RATING

Purpose: to classify students according to skill level for homogeneous grouping in classes or on teams.

General Skills:

1. Ball handling ability
2. Handling the body in relation to the ball
3. Ball and body skill combinations

Examples of Individual Skill Components of the General Skills:

Note: A detailed description of individual skills has been purposely avoided. The experience and expertness of the judges is valuable in this classification.

1. Ball handling ability: speed, accuracy in passing and catching, shooting, timing, control
2. Handling the body in relation to the ball: jumping, pivot, reaching, rebounds, changing direction
3. Ball and body skill combinations: dribbling, accuracy in shooting, over-all skill judgment

Number of Judges: three

Scale for Scoring of General Skills:

3 - Good

2 - Average (plus (+) and minus (-) may be used in scoring)

1 - Poor

SKILL ITEM	Students: List Number of Uniform																
1. Ball Handling Ability																	
2. Handling the Body in Relation to the Ball																	
3. Ball and Body Skill Combinations																	
TOTAL POINTS																	
SUM OF ALL JUDGES POINTS																	
FINAL SCORE																	

SCORE CARD

BOUNCE AND SHOOT

NAME:_____

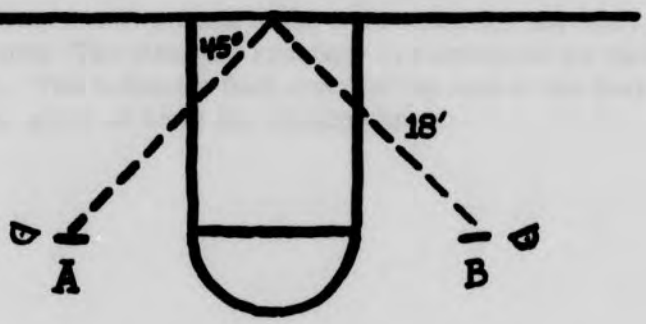
TIME	ACCURACY	DATE_____
1._____	1._____	ORIGINAL/REVISION
2._____	2._____	_____

APPENDIX B

Bounce and Shoot (Glassow, Colvin, and Schwartz)

Personnel: Timer, scorer, two ball catchers (subjects may catch for each other).

Equipment: Two chairs, two basketballs, stop watch, regulation backboard and rim, floor diagram as shown.



On either side of the basket at an angle of 45 degrees, an 18 foot dotted line is drawn from the center of the end line. Perpendicular to the 18 foot line, 24 inch lines are added. Starting from a point 1 foot behind and 30 inches to the outside of the 18 foot lines, additional lines 18 inches long are drawn. On each of the 18 inch lines, a chair with a ball is placed. A ball catcher stands behind each chair and replaces the ball on the chair after each pass from the subject.

Procedure:

The subject starts on the 24 inch line at the B side of the basket. On the signal "GO" from the timer, the subject picks up the ball from the chair, bounces, shoots, recovers the rebound and passes the ball back to the catcher at B. She runs immediately to A, picks up the ball from the chair and repeats the bounce, etc., passing the recovered shot back to the catcher at A. (This procedure is repeated, alternating five times on each side, making a total of ten shots.) Each bounce must start from behind the 24 inch line on the proper side.

The timer keeps the time from the signal "GO", and notes and records all fouls. The scorer records the points made on the basket shots, keeps a record of the number of shots and notifies the timer on the ninth shot.

Fouls: The fouls are: running with the ball, double bounce, failure to start from behind the 24 inch line.

Scoring: The score combines time and accuracy

a. The time to the nearest tenth of a second from the signal "GO" until the subject has caught the ball after the tenth shot at the basket.

b. The accuracy score for shooting on the following basis: two points for baskets made, one point for hitting the rim but missing the basket, nothing for missing the basket and the rim.

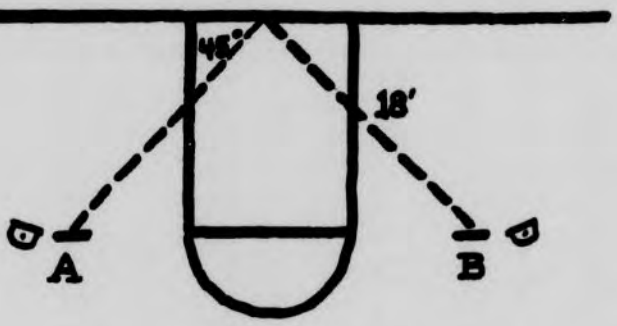
c. The addition of one second to the time score for any foul.

d. Final Score: The time and accuracy are combined for each trial as described previously. The subject's final score is the sum of the best two out of three complete trials, given at least two minutes apart.

REVISED: Bounce and Shoot Test

1. Personnel: Timer, scorer, two ball catchers (subjects may catch for each other).

2. Equipment: Two chairs, two basketballs, stop watch, regulation backboard and rim, floor diagrams as shown.



3. Procedure: On either side of the basket at an angle of 45 degrees, an 18 foot dotted line is drawn from the center of the end line. Perpendicular to the 18 foot lines, additional lines 18 inches long are drawn. See diagram above for placement of lines. On each of the 18 inch lines, a chair with a ball is placed.

   A ball catcher stands behind each chair and replaces the ball on the chair after each pass or tap from the subject.

   The subject starts at the B side of the basket. On the signal "GO" from the timer, the subject picks up the ball from the chair, legally progresses, shoots, and recovers the ball passing or tapping it back to the catcher at B. She runs immediately to A, picks up the ball from the chair and repeats the procedure. This procedure is repeated, alternating five times on each side making a total of ten shots. Each trial must start from behind the 18 inch line on the proper side.

4. Scoring: The score combines time and accuracy

   a. The time from the nearest tenth of a second from "GO" until the subject has caught the ball after the tenth shot at the basket.

   b. The accuracy score for shooting on the following basis: two points for basket made; one point for hitting the rim but missing the basket, nothing for missing the basket and the rim.

APPENDIX C

RAW DATA

Subject	Original Glassow, Colin, and Schwarz Test				Revised Test			
	First Administration		Second Administration		First Administration		Second Administration	
	Time	Accuracy	Time	Accuracy	Time	Accuracy	Time	Accuracy
1	58.5	14	58.5	18	60.0	16	59.0	16
2	62.3	12	58.5	13	60.0	12	55.9	9
3	65.6	17	62.0	15	61.3	13	53.9	17
4	52.0	20	49.0	20	49.2	19	48.8	19
5	60.0	15	56.5	19	58.3	11	56.2	14
6	57.8	11	53.4	8	56.2	12	53.2	12
7	58.4	13	54.4	18	63.3	12	55.2	16
8	56.7	13	55.5	16	57.2	16	55.7	18
9	59.7	9	55.8	12	54.1	11	51.6	13
10	57.7	16	56.2	20	58.4	17	53.6	18
11	55.0	16	54.6	19	50.1	20	48.3	14
12	53.0	13	50.9	17	50.2	15	48.5	18
13	52.6	12	49.1	16	51.4	14	48.9	16
14	55.7	20	53.2	11	53.1	17	50.0	19
15	55.5	16	52.9	19	51.9	15	47.9	19
16	50.0	14	51.0	18	49.0	18	49.3	18
17	48.5	9	50.1	16	48.0	15	48.5	18
18	52.7	19	50.0	19	50.1	17	49.7	18
19	53.0	17	51.2	17	48.5	15	49.1	18
20	53.9	19	58.0	17	51.2	17	49.4	19
21	55.1	17	51.5	18	50.8	17	48.4	17
22	47.9	10	51.8	12	49.5	15	49.5	17
23	54.8	14	50.0	15	51.6	13	48.0	15
24	57.0	16	52.0	17	52.9	17	52.3	17
25	54.3	16	54.2	14	53.6	15	52.9	17

RAW DATA

Subject	JUDGES' RATINGS Judge 1	Judge 2	Judge 3	Total
1	13	15	15	43
2	12	13	12	37
3	15	15	12	42
4	21	21	18	60
5	15	22	17	54
6	15	15	15	45
7	13	12	12	37
8	14	12	12	38
9	15	15	15	45
10	18	18	17	53
11	22	15	17	54
12	24	21	22	67
13	21	21	20	62
14	15	17	15	47
15	18	12	16	46
16	24	24	24	72
17	21	17	21	59
18	19	21	19	59
19	21	15	14	50
20	15	13	14	42

RAW DATA (Continued)

Subject	JUDGES' RATINGS Judge I	Judge 2	Judge 3	Total
21	19	14	15	48
22	24	25	27	76
23	21	15	17	53
24	15	12	14	41
25	16	15	16	47